Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

The areas of the circumscribing squares at end of successive hours differ by $1\div\frac{\pi}{4}=\frac{4}{\pi}$. Hence letting D=the diameter of stone at the beginning; D_1, D_2, etc., the same at the end of the 1st, 2d hours, etc. we have,

$$D=\sqrt{36}=6$$

$$D_1=\sqrt{36-\frac{4}{\pi}}=5.8929$$

$$D_2=\sqrt{36-\frac{8}{\pi}}=5.7839$$

$$D_3=\sqrt{36-\frac{12}{\pi}}=5.6728$$

etc., etc.

$$\text{Finally, } D_{24}=\sqrt{36-\frac{96}{\pi}}=2.3329.$$

Hence diameter worn off 1st hour=6−5.8929=0.1071,
and the 2d hour=5.8929−5.7839=0.1090,
and the 3rd hour=5.7839−5.6728=0.1111,
etc. etc.

The diameter worn off after the end of 24 hours is, 2.3329−2.1213 =0.2116.

Now $\frac{1}{2}\frac{\pi}{4}[(2.3329)^2-(2.1263)^2]=0.37$ of a cubic inch as it ought.

In 24 hours, $24\times\frac{1}{2}=12$ inches are ground off, leaving 12.37−12=0.37 of an inch, as just found, and this will consume $0.37\div\frac{1}{2}=.74$ of an hour, or 24.74 hours in all.

In the same way the diameters worn off the smaller stone are found.

The number of revolutions per hour are precisely as the diameters ground off and are therefore shown above.

[Prof. Philbrick solves for square apertaure and in part under a slightly different interpretation from Prof. Hume, whose solution was previously published. We publish above for comparison. H. W. Draughon's solution agreed with Prof. Hume's, except that it was in general terms.—Editor.]

6, Proposed by H. C. WHITAKER, B S., M. E., Professor of Mathematics, Manual Training School, Philadelphia. Pennsylvania.

Two men wish to buy a grindstone 42 inches in diameter and one foot thick at the center. To what thickness at the outer edge should the stone uniformly taper from the center so that each man may grind off 18 inches of the diameter and both have equal shares, the central six inches of the diameter being waste?

III. Solution by the PROPOSER.

[Refer to fig. used on pg. 174 of the May number]

Let equation of line generating the lateral surface of the stone be $x=2a-3by$.

$$\text{Then Vol}=\int 4\pi xy\,dy=4\pi\int(2ay-3by^2)dy=4\pi(ay^2-by^3)$$

Taking first the limits to be 21 and 12 and then 12 and 3 and equating

we have $297a-7533b=135a-1701b$ or $a=36b$. But $a=3$ and therefore $b=\frac{1}{12}$.

Substituting these values and $y=21$ in the first equrtion $x=\frac{3}{4}$ making the width $1\frac{1}{2}$ inches.

PROBLEMS.

18. **Proposed by M. C. STEVENS, A M., Professor of Mathematics, Purdue University, Lafayette, Indiana.**

Show generally that a system of confocal conics is self orthogonal. [From Johnson's Differential Equations.]

19. **Propoped by F. P MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy in New Windsor College, New Windsor, Maryland.**

A spherical shrapnel-shell moving in a practically horizontal direction with a constant velocity $V_1=1500$ feet per second and at a uniform height $h=\frac{1}{2}g$ feet, explodes *equably* scattering the inclosed balls and fragments with a uniform velocity $V_2=1200$ feet per second. Draw the curve bounding the *minimum surface on the earth* on which the inclosed balls and fragments of the shell have fallen.

QUERIES AND INFORMATION.

Conducted by J. M. COLAW, Monterey, Va. All contributions to this department should be sent to him.

Definitions of a Fraction. A Query by "H. C. K."

Three views of what a fraction is are here given, with the request that every reader send the editor of this department a card stating his preference.

(*A*). A fraction is one or more of the equal parts into which "a unit" or anything is divided; as, $\frac{m}{n}$. When $m>n$, the fraction is called "improper".

(*B*). A fraction is a number of the equal parts of one or more like units or things. The fraction $\frac{m}{n}$ is proper whether $m>n$ or $m<n$.

(*C*). A fraction is any number of the equal parts into which anything is divided, less than the whole number of such parts. When $m=n$, $\frac{m}{n}$ is a unit. When $m>n$, $\frac{m}{n}$ is a mixed number in fractional form,—not a fraction at all, since we can not take m equal parts of a thing divided into only n parts.

"An Unreasonable Rule" Again. By Professor P. H PHILBRICK.

Mr. Pratt fails to make out his case. He does show indeed that the rate of convergency in the vicinity of the parallel of 50° latitude is nearly one-fifth more than near the parallel of 40° latitude but no one, so far as I know,